the *Red Harvester Ant*

AND HOW TO SUBDUE IT

Farmers' Bulletin No. 1668

U. S. DEPARTMENT OF AGRICULTURE

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Washington, D. C. Revised December 1953

262015°—53

THE RED HARVESTER ANT

And How To Subdue It

By O. L. Barnes, *entomologist*, and N. J. Nerney, *biological aid, Division of Cereal and Forage Insect Investigations, Bureau of Entomology and Plant Quarantine, Agricultural Research Service*[1]

THE RED HARVESTER ANT[2] causes heavy losses in cultivated fields and orchards in the Southwestern States. Bare areas ranging from 3 to 35 feet in diameter, cleared of vegetation by colonies of these ants, stand out prominently in alfalfa or grain fields in this part of the country (fig. 1).

LOSSES CAUSED BY RED HARVESTER ANTS

The greatest loss caused by these ants is that resulting from land wasted in their barren areas and runways. A 20-acre field heavily infested with ants will often contain as much as a quarter-acre of land wasted in this way. The loss on this quarter-acre depends on the kind of crop grown, but it could easily amount to $25 or $30. When the colonies are located in a field planted to citrus, dates, grapes, or other high-priced fruits, the ants often destroy many of the trees or shrubs, and cause a loss of many dollars per acre.

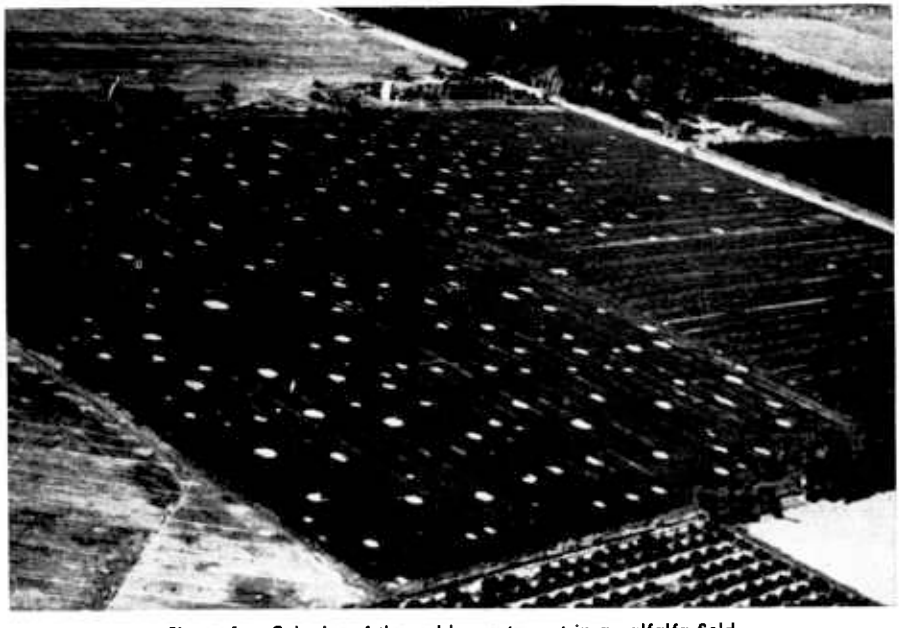

Figure 1.—Colonies of the red harvester ant in an alfalfa field.

This ant also inflicts painful stings on man and animals. It works to a great depth beneath the surface of the ground, and the expense of control may therefore be rather high and the results uncertain.

[1] The previous edition of this bulletin was prepared by V. L. Wildermuth and E. G. Davis.

[2] *Pogonomyrmex barbatus.*

The ants also cause a direct loss to seed crops by collecting the seeds for storage. One hundred colonies on 20 acres of alfalfa land, consuming 1 pound of seed per colony, which would be a fair average, would cause a loss of more than $25.

A loss not so easily measured is that caused by the ants in collecting freshly sown seed. In newly seeded alfalfa fields the gathering of seeds results in a thin stand for several seasons. Nests have been found with chambers containing large quantities of oats collected from recently planted fields.

WHERE THE ANTS ARE FOUND

Colonies of the red harvester ant are found at the lower altitudes in Oklahoma, Texas, New Mexico, Arizona, and California, as well as in Mexico. They are much more numerous on cultivated than on noncultivated land, such as the desert, where food is scarce. They are also more abundant in some cultivated areas than in others. One field may be literally dotted with colonies and an adjoining field contain only an occasional nest. A field of 8 acres at Tempe, Ariz., contained 265 colonies, each colony surrounded by a cleared area 5 feet or more in diameter.

A closely related species, known as the western harvester ant,[3] occurs in the higher altitudes and colder districts of approximately the same territory as the red harvester ant, but may be distinguished from it by its nesting habits. The western harvester ant builds a mound at the main opening in the center of the cleared area. The habits of the colony, methods of feeding, and means of control are practically the same for both species.

[3] *Pogonomyrmex occidentalis.*

ANNOYANCE TO PERSONS AND ANIMALS

Harvester ants are a great nuisance around dwellings and public buildings, about lawns, dooryards, corrals, and similar places in the vicinity of their nests. Running promiscuously about, they invariably get on people and bite or sting them, sometimes causing severe pain and swelling. Small children should not be left alone out of doors where the ants are present. Livestock are also greatly annoyed by these pests. Dairy cows may suffer numerous swellings, especially on the udder, as a result of stings. Such attacks often reduce milk production.

DESCRIPTION OF THE STAGES

In its life cycle the harvester ant passes through four stages—the egg, the larva, the pupa, and the adult (fig. 2).

The Eggs

The eggs, which are laid by the queen in the chambers of the colony, are about half the size of a pinhead. They are longer than wide, are shaped like capsules, and are iridescent milk white. They are usually clustered together.

The Larvae

The larvae (fig. 2, *D*), which hatch from the eggs, remain in the chambers of the colony. They are cream colored and are shaped like crook-necked squashes, the smaller, crooked portion ending in a very small head. The full-grown larvae are about ¼ inch long.

The Pupae

The pupae (fig. 2, *E*) are ¼ to ½ inch long, pale cream in color, and have the legs and feelers, or antennae, folded on the underside.

The Adults

There are four forms of the adult ant—winged females (fig. 2, *A*), queens (fig. 2, *B*), males (fig. 2, *C*), and sterile females or workers (fig. 2, *F*). The workers are the red-

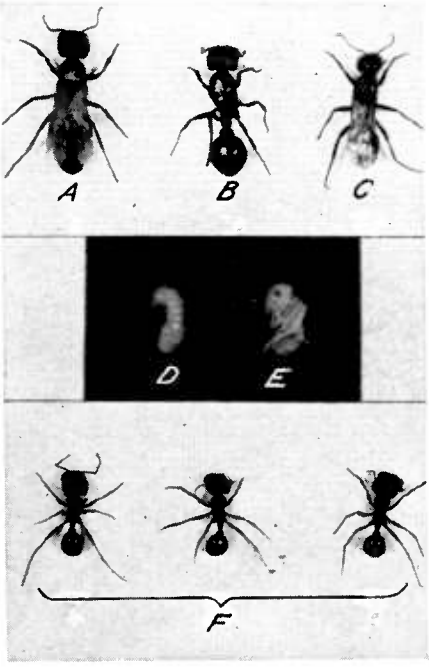

Figure 2.—Forms and stages of the red harvester ant: A, Winged female; B, queen; C, male; D, larva; E, pupa; F, workers. All about 1 ½ natural size.

dish-brown ants seen in large numbers hurrying to and from the colony in search of food. They are ¼ to ½ inch long. The winged males and females are the sexually mature individuals that emerge from the colony during swarming time to mate and establish new colonies. The females are larger than either the workers or the males, and are slightly darker and more robust, and have larger heads. The males do not possess stings. The queen is a mated female that has discarded her wings and established a colony.

STRUCTURE OF AN ANT NEST

The barren circular area, commonly called an ant hill, surrounding the entrance hole of the nest is the result of the activity of the ants in cutting down any vegetation that attempts to grow there. The size of this area depends on the tunneled area underneath the surface of the ground. From the cleared area on the surface are usually one or more pathways into the surrounding vegetation. These pathways are 1 to 4 inches wide and range up to 200 feet in length. Where they adjoin the nest they are as barren as the cleared circle, but they gradually become less distinct and eventually disappear in the vegetation. The paths make travel easier and faster between the nest and the area that is being harvested by the worker ants.

The entrance hole into the nest of the red harvester ant is usually located at about the center of the circle bared of vegetation. It joins the network of tunnels and chambers underground and is normally ¼ to ½ inch in diameter. More than one entrance hole is frequently found, especially when the colony has been disturbed by soil cultivation.

The nest is a series of subterranean tunnels and chambers. The tunnels, about ¼ inch in diameter, lead in and out of the nest and from one chamber to another. They extend downward at different locations, with series of chambers branching off from them. The chambers are flat-bottomed, with dome-shaped ceilings. They range in size from ¼ inch wide and ½ inch long to 10 inches wide and 1 foot long. The larger ones are usually farthest down in the ground. Stores may be found in any of the chambers, but those near the surface are used at times as nurseries in which to rear the young. The

larger compartments in the lower half of the nest serve as winter quarters for the ants.

The type of soil affects the general arrangement of the tunneling. If the soil is porous, such as a sandy loam, for a considerable depth, so that the nest can be extended downward without interruption, its general shape is that of a cone, usually from 8 to 10 feet in depth, with the apex, or small end, at the bottom. The ants' progress is often checked by a very hard layer of soil, in which case they spread the nest laterally. A high water table has the same spreading effect on the nest.

ACTIVITIES OF THE COLONY

The colony consists of one queen and innumerable workers, together with eggs, larvae, and pupae. The winged males and females appear only at certain times of the year. Like other ants, the workers are very strong, being able to carry objects several times their own size. They are vicious when molested, but go busily about their tasks when left undisturbed. The colony stubbornly resists interference, and the pugnacious habits of its members have caused them to be known as among the most ferocious of all American ants. When molested, they not only turn to give battle but actually run about in search of the intruder. When once they have set their powerful jaws in an object, there is no way to remove them without tearing the head from the rest of the body, and even then the jaws may remain locked. Their poisonous sting is also an effective weapon for defense.

The eggs, larvae, and pupae remain hidden in the chambers of the nest and are seldom seen except when the ants carry them to a new location. The pupae are then often mistaken for the eggs.

Swarming

Swarming occurs when the winged males and females emerge in large numbers and mate. In southern Arizona swarming takes place usually in August and September, although it may occur at any time from April to October. It frequently follows a shower in the afternoon and is ordinarily completed the same day on which it is started.

Males and females by the hundreds gather around the entrance hole, or climb upon grass, sticks, rocks, or any other object projecting into the air, in their efforts to fly away. Mating occurs usually during flight soon after the winged forms emerge from the nest. The males die soon after mating.

During the swarming period winged male ants may congregate in large numbers on elevations in the vicinity of the colonies. They often form a mass on the tops of low mountains or buttes, or even on the tops of high buildings. Toward the end of the swarming period dead males may be found piled up in such locations.

Establishment of the Colony

The mated female establishes the new colony. She removes her wings either by pulling them off with her mouth parts and legs or by rubbing against rocks, grass, or sticks. She then immediately begins digging into the ground. She first digs a hole about 10 inches deep, and constructs from one to four small dome-shaped chambers branching off from it. She next plugs up the entrance hole with the last bit of dirt excavated, and deposits a cluster of about 50 eggs.

These eggs and the resulting larvae and pupae are taken care of by the young queen. She carries the eggs from one chamber to another

so that temperature and moisture conditions will be right for hatching. When the eggs hatch, she feeds the larvae a secretion from the fatty tissue of her body. These larvae develop into workers. The first workers, owing to the fact that they are reared on the limited amount of food from the queen's body, are smaller than those that develop later.

The queen spends the rest of her life within the tunnels and chambers, continuing to lay eggs. She mates only once during her lifetime.

Only a very small percentage of the females live to establish new colonies that are strong enough to survive. Many are eaten by birds and toads. Some fail to mate in their hasty flight. Thousands are no doubt lost in their attempts to find suitable places in which to start colonies, and many females lack sufficient vitality to establish a colony that can survive the winter. The flooding of fields in irrigated districts or the occurrence of heavy rains also greatly hinders their attempts to colonize.

New colonies are most easily established in fields having a porous soil or along ditch banks, where the soil is easily excavated. Where the soil is hard or rocky, the females are unable to penetrate to the desired depth, and failure is certain. One alfalfa field contained 50 unsuccessful new workings of young queens in an area of 60 square feet. Although the females may fly for considerable distances, most new colonies are established within a few hundred feet of the old colony.

Colony Development

After the new colony is established, the dirt with which the queen plugged the entrance hole is removed by the workers. If the colony has been established in early summer, the nest is opened up soon thereafter, but where swarming occurred in late summer or early fall, the new nest is not opened up until the following spring. In the latter case a much larger portion of the new colony fails to survive the winter owing to lack of food. The ants enlarge the nest by extending its tunnels and constructing new chambers. Seeds for food are harvested and stored in some of the chambers, and the new colony becomes the scene of much activity.

When the first of the workers issue in the newly formed nest, the queen again starts egg laying and thereafter limits her activity solely to this function. The workers, besides expanding the nest, bringing in food, removing refuse from the chambers, and guarding against intrusion, also care for the eggs, larvae, and pupae, and feed the queen.

The colony increases in size for a few years until it reaches maximum development. The queen continues to lay eggs, which produce an ever-increasing number of workers. The number of the chambers is increased, and their size is enlarged, as is the cleared area on the surface of the ground. Colonies ordinarily survive for several years. One colony under observation at Tempe, Ariz., was still active after 19 years.

EFFECT OF WEATHER ON ANT ACTIVITY

The worker ants are most active above ground on warm, sunny days, especially in early spring and late fall. In hot weather, however, they may stay in the nest during the middle of the day and be most active early in the morning and late in the afternoon. In very warm areas, as in the low valleys of southern Arizona, the colonies often continue their activities on sunny days throughout the winter.

FOOD AND FOOD STORAGE

The red harvester ant goes out into the field surrounding the nest and harvests seeds, which are its principal food (fig. 3).

Figure 3.—Red harvester ant carrying a grain of wheat. Enlarged.

Figure 4.—Seeds of various plants found in chambers of the red harvester ant.

Apparently any seed that can be carried is taken, and the variety largely depends upon the vegetation found nearest the colony. Small seeds are preferred. Alfalfa, bur clover, Johnsongrass, oats, wheat, Bermuda-grass, wild sunflower, and mesquite beans have been found in the chambers (fig. 4). Such products as bran or rolled oats are often carried in. The food materials are undoubtedly moved about from chamber to chamber as the space is needed for other colony activities. In the fall, when seeds are most numerous, most of the chambers may be largely filled with stores.

PROTECTION AGAINST ANTS

The bites and stings of these ants affect some people more severely than others. However, it is never a pleasure to be attacked by these determined insects. While working among them, it is advisable to dress in such a way as to prevent their gaining entrance into the clothing.

Rubber boots are an excellent protection. The ants cannot readily climb up the smooth sides and soon fall back to the ground. Knee boots are much easier to work in and give just as much protection as hip boots, provided they have a really smooth surface.

Knee-high shoes with the trouser legs tucked inside afford considerable protection. The ants can occasionally climb upon a shoe, especially where it is laced. Shoes that lace tightly so that the laced edges are drawn closely together are desirable. Any method of fastening the trousers tightly about the ankle, such as the wearing of leggings or tying the bottom of the trousers, is helpful. Regardless of the kind of protective measures taken, one should stamp the feet on the ground frequently to dislodge any ants that have started to climb.

CONTROL MEASURES

Several insecticides will control the red harvester ant under certain conditions, but others that from time to time have been recommended as remedies for this annoying pest are not permanently effective. No treatment that does not kill the queen will destroy the colony. On the other hand, a treatment that destroys the queen and most of the workers at a time of the year when there are no young in the colony will provide complete control, as the few remaining workers will eventually die, and there will be no young ants left to continue the colony.

Dusts

When many of the ants are active on the surface, use a dust.

Dieldrin.—One of the most effective and easily applied dusts contains 2 percent of dieldrin. Spread about ½ pound thinly in a continuous band, 4 to 6 inches wide, making a circle 5 to 6 feet in diameter centering at the nest entrance (fig. 5). A hand scoop is convenient for this treatment. For small colonies, with a cleared area less than 4 feet in diameter, place the band of dust around the edge of the cleared area.

In the larger colonies new entrances may open outside the dust ring. Treat these entrances individually or include them in the same ring with the original entrance when making the next application. If the band of dust is broken or washed away by rain or irrigation water, apply a new band.

Chlordane.—A 5-percent chlordane dust applied at the same dosage and in the same manner as dieldrin will give fairly good control. It will not remain effective so long as the dieldrin; therefore, more applications are usually required to subdue the ant colonies.

For best results apply these dusts during warm periods when there is little wind. In areas where irrigation is practiced, apply them as soon as possible after the surface of the flooded land has dried.

Fumigants

When practically all the ants are in the nest, use a fumigant.

Carbon Disulfide.—It is possible to kill a high percentage of ants, even in large colonies, with a single application of carbon disulfide.

Colonies that have cleared an area not more than 4 feet in diameter may be treated by pouring 4 fluid ounces into the entrance hole and stamping dirt into it with the heel of the shoe.

In a day the ants will remove dirt and other debris which clog the tunnels and would retard penetration by the fumigant. On the following day pour 8 fluid ounces of carbon disulfide into the exposed

Figure 5.—Method of applying dieldrin dust around the entrance of a medium or large ant nest. The diameter of the dust ring is 5 feet and that of the cleared area surrounding the entrance to the nest more than 9 feet.

Colonies having cleared larger areas require more fumigant. Such colonies should be prepared the day before the treatment is made.

To prepare a colony for treatment remove a 6-inch layer of soil from an area 3 to 6 feet in diameter surrounding the entrance. The extent of excavation will depend on the size of the colony and the evident lateral expanse of the tunnels and chambers in the first 6 inches of soil. Removal of the layer of dirt exposes the vertical tunnels which lead to the chambers at various levels.

vertical tunnels, distributing it equally among them. Close the openings with firm soil and replace the layer of dirt that was removed to expose the tunnels.

Make subsequent applications directly into the original entrance or into new entrances that may be opened at some distance from the old one, without removing a layer of soil. For re-treatments use 4 fluid ounces of carbon disulfide per colony.

Apply carbon disulfide in the early morning or late evening. Never apply it at midday.

Methyl Bromide.—This fumigant has given good control of ant colonies in moist soil. It has not been satisfactory in dry, sandy soil. Use a mechanical dispenser that will release it into the colony entrance 6 to 8 inches below ground level. One such dispenser holds a 1-pound can of methyl bromide, and is fitted with a release valve and several feet of flexible tubing, tipped with a short brass or copper tube for insertion into the colony entrance. Apply 1 to 2 fluid ounces of the fumigant and pack the soil tight over the entrance hole to retain the gas.

Caution

Dieldrin and chlordane are poisons. Read and follow carefully all directions given on the containers. Store these dusts away from children and domestic animals. Keep them off the skin and away from the eyes, nose, and mouth. Wear a respirator while applying a dust, and stay on the windward side of the spot where the dust is being released. Bathe thoroughly and change to clean clothing after dusting.

In the event of poisoning with dusts, call a physician immediately. Wash thoroughly with soap and water. Take a tablespoonful of salt in a glass of warm water to induce vomiting and repeat until the vomit fluid is clear. Lie down and remain quiet.

Do not dust vegetation that may be eaten by man, dairy animals, or animals being finished for slaughter, and do not leave lumps or piles of dust around treated areas. Do not apply the dust broadcast.

Carbon disulfide and methyl bromide are poisonous gases, and methyl bromide lacks a distinctive odor. Do not inhale the fumes of either fumigant. Handle both materials carefully according to directions given on the containers. Store them in a cool place.

Carbon disulfide is inflammable and explosive. Never open a container of it where there is little air in circulation, or expose it near fire in any form.

Methyl bromide is particularly dangerous at high temperatures. Do not store it in buildings where people live or work.

NEED FOR REPEATED INSPECTION AND TREATMENT

A colony may become inactive soon after it is treated with an insecticide, appear as though dead, sometimes for several months, and then resume apparently normal activity. Two or more dust or fumigant treatments 2 or 3 weeks apart are frequently necessary before a colony is destroyed or its activity suspended for a long period. If the ants have plenty of stored food and are disturbed, they may close the entrance and stay underground for many months at a time. All treated areas should be inspected from time to time and, if necessary, re-treated so that surviving ants can be killed.

U. S. GOVERNMENT PRINTING OFFICE: 1953

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